Syllabus for Earth Sciences 3350Y: Advanced Field Mapping Techniques

(May 1 to 11, 2018**)**

Instructor: Dr. Desmond Moser

TAs: TBD

Course Description

An eleven day field school in an area of variably metamorphosed and deformed bedrock. Emphasis will be on mapping techniques at a range of scales (from individual outcrops to macroscopic scales). The students will learn how to identify, measure, and document geological features at the outcrop scale and to make connections between outcrops. They are required to understand the structure of their map area in three-dimensions and to establish a geological history of their map area.

Pre-requisite(s): Earth Sciences 2201 and 2250y, any two of Earth Sciences 3313a/b, 3314a/b and 3315a/b.

Field course in May, 0.5 courses.

Course activities: *The stages of geological fieldwork*

1. Preparation for fieldwork (before departure)

- Equipment for living and field work (for details, see the Logistics)
- Base maps and/or aerial photos for mapping of suitable material, format, and scale
- Sign appropriate forms

2. Introduction to the field area and mapping skills (large group activity, 2-3 field days)

- Visit selected areas to view the general geology and to learn field observation, documentation, and mapping skills
- Mapping exercise on a mesoscopic scale

3. Mapping and field notes (5 days)

Fieldwork consists of moving from one rock exposure to another, identifying rocks and recording their mineralogy, texture and fabric orientation(s), and documenting the contacts between units. Recording the field observation is a mixture of the following:

- Mapping on the base map, and/or aerial photo
- Describing, sketching, and photographing details of rocks
- Describing, sketching, and photographing details of contacts, structures

A checklist for mapping in your area:

1) Description of all rock units shown in your map area including sketches (photos optional)
2) Description of contacts, faults, folds, foliations, and lineations including sketches. Note you may have more than one generation of foliations and lineations.
3) Enough measurements (both number and distribution over the area) of each generation of structural element for equal-area projection (stereonet) analysis
4) Is your map area completely covered? Are field stations reasonably distributed in the map area?
5) Writing up the final report (1 day)

(continued on back)

Final Report Layout:
A typical report is about 12 to 15 pages (single spaced) and it should consist of the following sections:

1) Introductory statements:
   - The area studied (geographically and geologically) and its boundaries.
   - A daily record of group member duties.
   - Base or aerial photo used, the scale, GPS unit/datum used, estimate of precision in metres
   - A brief statement of the geographic layout of the outcrops of different map units, their relationship to topography, degree of exposure, and general weathering characteristics (field sketches may be included)

2) Description of rock units (from oldest to youngest)
   - Give a description of main rock types in the map area and a statement of how map units are defined. Describe each map unit in detail including its rock type(s), mineral compositions (primary, secondary, alteration), mineral textures, primary structures,. If absolute geochronology information is available, cite age and literature source for the age.

3) Deformation structures
   - Group structures into a chronological sequence from oldest to youngest.
   - Explain your evidence for the different generations of structures by overprinting relationships. Support this with field sketches, photos.
   - Construct at least one geologic cross-section across the average regional strike of structures/unit contacts. Be sure to indicate vertical and horizontal scales.
   - Describe these structures, generation by generation, type by type.
   - Present the orientation data by equal-area projection diagrams. Divide your map area into homogeneous domains if necessary.

4) Summary of geometrical patterns and geological history
   - Place the observed generations of structures in sequence with supporting evidence for each relative age relationship.
   - Summarize the history of deformation and metamorphic events from oldest to youngest

Each report must be accompanied by your field notebook, a fair copy of your map, related cross sections, and equal-area projections.

Marks
Field Conduct: 10%
Field Participation and Exercises: 20%
Field Notes: 25%
Final Report 45%
Accessibility Statement
Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.